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(54) Title: TREATING SLURRIES

(57) Abstract: This invention relates to a composition for treating inorganic slurries and to a method of treating inorganic slurries with the aforesaid composition so as to maintain the slurries in a substantially homogeneous phase. The composition comprises a THP<sup>+</sup> salt and a dispersant selected from the group consisting of: (i) phosphonated compound containing at least one tertiary nitrogen atom; (ii) phosphonated oligomers of unsaturated acids; (iii) homopolymers of unsaturated acids; and (iv) Polyphosphates The THP<sup>+</sup> salt is preferably THPS

## TREATING SLURRIES

This invention relates to a composition for treating inorganic slurries and to a method of treating inorganic slurries with the aforesaid composition  
5 so as to maintain the slurries in a substantially homogeneous phase.

The present invention will be described herein with particular reference to calcium carbonate-based slurries, especially those used in paper-making processes, although it is not to be construed as being limited thereto.

10

Most inorganic slurries contain about 70% to 80% by weight of solids. Many inorganic slurries (particularly those based on calcium carbonate) are known to be susceptible to bacterial contamination and it has been the practice to add one or more biocidally-active materials to the slurries in  
15 order to minimise such contamination.

Phosphorus-containing compounds, in particular tetrakis(hydroxyorgano)phosphonium salts ( $\text{THP}^+$  salts) are known to be effective biocides. Experimental work carried out by the applicants has  
20 shown, for example, that the addition of a solution of tetrakis(hydroxymethyl)phosphonium sulphate (THPS) to a calcium carbonate-based slurry can give rise to a reduction in bacterial count of  $10^4$  in 2 hours.

25 However, it is also known that addition of THPS alone to a slurry results in instantaneous heterogeneous thickening and aggregation of the slurry.

The applicants have found that the use of a composition comprising a  $\text{THP}^+$  salt and a dispersant will provide continuing preservation against  
30 bacterial contamination, while at the same time maintaining the slurry in a substantially homogeneous phase.

Accordingly, in a first aspect, the present invention provides a composition for treating an inorganic slurry, the composition comprising:

- 5 (a) a tetrakis(hydroxyorgano)phosphonium salt (hereinafter THP<sup>+</sup> salt);

and

- (b) a dispersant selected from the group consisting of:

10

- (i) phosphonated compounds containing at least one tertiary nitrogen atom;

- (ii) phosphonated oligomers of unsaturated acids;

15

- (iii) homopolymers of unsaturated acids;

and (iv) polyphosphates.

- 20 In accordance with the present invention, the THP<sup>+</sup> salt is preferably tetrakis(hydroxymethyl)phosphonium sulphate.

Alternatively, the THP<sup>+</sup> salt may be tetrakis(hydroxymethyl)phosphonium chloride, phosphate, nitrate or oxalate.

25

A preferred example of a dispersant of the type (b)(i) is a compound having one tertiary nitrogen atom, such as a sodium salt of nitrilo-tris(methylene phosphate), particularly the tetra-sodium salt.

- 30 Preferred examples of dispersants of the type (b)(ii) include those oligomers having the general H(CH<sub>2</sub>OM.CH<sub>2</sub>OM)<sub>n</sub>PO<sub>3</sub>M<sub>2</sub>, wherein M is a

cationic species such that the oligomer is soluble in water and n is a number greater than 1.

Other suitable oligomers are disclosed in the applicant's European Patent  
5 Specification 0 491 391.

A preferred example of a dispersant of the type (b)(iii) is a homopolymer of acrylic acid, especially a homopolymer having a molecular weight in the range 2000 to 5000.

10

Preferred examples of dispersants of the type b(iv) include sodium tripolyphosphate.

15

In a second aspect, the present invention provides a method of treating an inorganic slurry to maintain the slurry in a substantially homogeneous phase, the method comprising the addition to the slurry of an effective amount of a composition according to the first aspect of the present invention.

20

The inorganic slurry may, for example, comprise a calcium carbonate-based slurry.

Alternatively, the inorganic slurry may comprise a pigment slurry, a clay slurry or a cement slurry.

25

Preferably, the ratio of THP<sup>+</sup> salt to dispersant in the composition is about 2:1 (as active ingredients).

30

Suitably, the composition may be added to the slurry in an amount in the range 10ppm to 1000ppm (by weight of the slurry), for example about 750ppm (by weight of the slurry).

The present invention will be illustrated by way of the following examples.

- 5 In the examples, a 75% calcium carbonate slurry (commercially known as Setacarb) was treated with:

Example 1 : THP<sup>+</sup> salt alone.

- 10 Example 2 : THP<sup>+</sup> salt and dispersant of type (b)(i).

Example 3 : THP<sup>+</sup> salt and dispersant of type (b)(ii).

- 15 The amounts of each additive used, and the results, are given in the TABLE below.

TABLE

	Example No.	THP <sup>+</sup> salt (ppm)	Dispersant (ppm)	Result
20	1	(a) THPS 750ppm	(b) (nil)	Instant heterogeneous thickening
25	2	(a) THPS 750ppm	b(i) 375ppm	No thickening
30	3	(a) THPS 750ppm	b(ii) 375ppm	No thickening

Notes to TABLE

- (a) An aqueous solution of tetrakis(hydroxymethyl)phosphonium sulphate (75% a.i.), available as TOLCIDE®-PS75.
- 5
- (b)(i) An aqueous solution of the tetra sodium salt of nitrilo-tris(methylene phosphonic acid), available as BRIQUEST® 301-32S.
- 10 (b)(ii) A homopolymer of polyacrylic acid, having a molecular weight in the range 2000-5000 and available as BEVALOID®211.

CLAIMS

1. A composition for treating an inorganic slurry, the composition comprising:

5

(a) a tetrakis(hydroxyorgano)phosphonium salt (herein THP<sup>+</sup> salt);

and

10 (b) a dispersant selected from the group consisting of:

(i) phosphonated compounds containing at least one tertiary nitrogen atom;

15 (ii) phosphonated oligomers of unsaturated acids;

(iii) homopolymers of unsaturated acids;

and (iv) polyphosphates.

20

2. A composition according to Claim 1, in which the THP<sup>+</sup> salt is tetrakis(hydroxymethyl)phosphonium sulphate.

25 3. A composition according to Claim 1, in which the THP<sup>+</sup> salt is tetrakis(hydroxymethyl)phosphonium chloride, phosphate, nitrate or oxalate.

30 4. A composition according to any one of Claims 1 to 3, in which the dispersant (b(i)) is a phosphonated compound containing one tertiary nitrogen atom.

5. A composition according to Claim 4, in which the dispersant (b(i)) is a sodium salt of nitrilo-tris(methylene phosphonate).
6. A composition according to Claim 5, in which the salt is the tetra-  
5 sodium salt.
7. A composition according to any one of Claims 1 to 3, in which the dispersant (b(ii)) is a phosphonated oligomer of maleic acid.
- 10 8. A composition according to Claim 7, in which the oligomer has the general formula  $H(CH_2OM.CH_2OM)_n PO_3M_2$ , wherein M is a cationic species such that the oligomer is soluble in water and n is a number greater than 1.
- 15 9. A composition according to any one of Claims 1 to 3, in which the dispersant (b(iii)) is a homopolymer of acrylic acid.
10. A composition according to Claim 9, in which the homopolymer has a molecular weight in the range 2000 to 5000.
- 20 11. A composition according to any one of Claims 1 to 3, in which the dispersant (b(iv)) is sodium tripolyphosphate.
12. A method of treating an inorganic slurry to maintain the slurry in a substantially homogeneous phase, the method comprising the addition to the slurry of an effective amount of a composition according to any one of  
25 Claims 1 to 11.
13. A method according to Claim 12, in which the ratio of THP<sup>+</sup> salt  
30 to dispersant in the composition is about 2:1 (as active ingredients).

14. A method according to Claim 12 or 13, in which the composition is added to the slurry in an amount in the range 10ppm to 1000ppm (by weight of the slurry).
- 5 15. A method according to Claim 14, in which the composition is added to the slurry in an amount of about 750ppm (by weight of the slurry).
16. A method according to any one of Claims 12 to 15, in which the  
10 slurry comprises a calcium carbonate-based slurry.
17. A method according to any one of Claims 12 to 15, in which the slurry comprises a pigment slurry, a clay slurry or a cement slurry.
- 15 18. A method of treating an inorganic slurry, substantially as hereinbefore described with reference to the Examples.

# INTERNATIONAL SEARCH REPORT

National Application No

1/GB2004/000056

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 7 A01N57/34 D21H21/36 D21H19/46 D21H19/58 D21H19/64  
 C09C1/02 C04B14/28  
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According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A01N D21H C09C C04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, CHEM ABS Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/08127 A (FIDOE STEPHEN DAVID ; JONES CHRISTOPHER RAYMOND (GB); RHODIA CONS SPEC) 31 January 2002 (2002-01-31) page 3, line 25 - page 4, line 4 page 4, line 25 - page 5, line 9 page 8, line 5 - line 10 page 14, line 19 - page 15, line 2; claims 1,9,14,29,39,46 ----- US 6 180 056 B1 (COMSTOCK DANIEL L ET AL) 30 January 2001 (2001-01-30) column 1, line 55 - column 2, line 6 column 3, line 63 - column 5, line 22; claims 1,4,23,24 ----- -/-	1-11
X		1-6,9,10

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

\* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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